DOCUMENT RESUME

ED 159 619 CS 004 346

AUTHOR Maguire, Thomas O.; And Others
TITLE The Development of Word Meaning Discrimination in Children.
INSTITUTION Alberta Univ., Edmonton. Div. of Educational Research.
REPORT NO RIR-74-3
PUB DATE [74]
NOTE 29p.

EDRS PRICE MF-$0.83 HC-$2.06 Plus Postage.
DESCRIPTORS Associative Learning; *Concept Formation; *Developmental Stages; Elementary Secondary Education; Grade 5; Grade 8; Grade 11; Language Development; Language Research; *Language Skills; *Semantics; Word Recognition; *Word Study Skills
IDENTIFIERS Word Sorts

ABSTRACT

To determine if children could discriminate among the 24 ways in which words possess meaning (logico-semantic relationships) defined by Evanechko and to see if this ability changed over time, 570 fifth, eighth, and eleventh graders were presented the task of sorting decks of cards containing examples of the 24 categories. Although it was not possible to have subjects sort examples of all 24 relationships at one time, an attempt was made to have groups of subjects work with relationships that were likely to be confused with each other. The results support the validity of the distinction among the 24 logico-semantic relationships. The most important finding was the strong developmental trend that was found both in the increased congruence of the latent categories to the theoretical categorization and in the increased sophistication of the grouping strategies employed by the subjects over age levels. The findings also suggested that greater changes occurred between the fifth and eighth grades than between the eighth and eleventh grades. Future research should explore the development of flexibility in children's word definition abilities. (FL)

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THE DEVELOPMENT OF WORD MEANING DISCRIMINATION IN CHILDREN

Thomas O. Maguire
University of Alberta

Ronald B. Patsula
Edmonton Separate School Board

Peter O. Evanechko
University of Victoria

Division of Educational Research
Faculty of Education
The University of Alberta
Edmonton, Canada

INTRODUCTION

The mediational view of meaning outlined by Osgood et. al. (1957) suggests that a useful model for meaning is the notion that a word derives its meaning by being embedded in an individual's semantic space. Semantic space is a term used to describe the network of relationships which link internal mediating responses. The position of a word in the semantic space in effect describes its meaning. In their studies of the connotative meaning of words, Osgood and his associates produced a dimensional analysis of the connotative links that exist in the semantic space. There are many other kinds of links that exist, however, and in the present study, attention was directed toward the emergence of these links of children.

Evanechko (1970) and Evanechko and Maguire (1972) suggested that the semantic space is comprised of 24 kinds of logico-semantic relations which in effect are the ways in which words possess meaning. In the previous studies, attempts were made to resolve the 24 kinds of meaning into a smaller set of dimensions, and to see if the resulting configurations when derived for children of two age levels indicated a developmental trend. The results suggested that differences between children in grades 5 and 8, existed in the semantic structures, with the younger children having spaces oriented toward experience, and the older children showing more sophisticated class structures.

The Evanechko and Maguire results were consistent with the findings of several researchers who have investigated the development of word definition abilities in children. (Al-Issa, 1969; Wolman and Barker, 1965; and Swartz and Hall, 1972). All results indicate that as children grow older their choice of definitions pass through three stages,

descriptive (an apple is red), functional (an apple is good to eat) and categorical or abstract (an apple is a fruit).

Previous research in the area has focused on the development of the child's ability to use categorical definitions, but little attention has been paid to a possible expansion in the child's semantic space. According to the mediational view, as the child grows older and gains more experience with his verbal environment, there should be a concommitent increase in his ability to attach meaning to words in different ways. The purpose of the present study was to move in this direction by seeing if children could discriminate among the various logico-semantic relationships, and further to see if this ability changed over time.

The 24 logico-semantic relationships (shown in Table 1) used in the Evanechko and Maguire study (1972) were derived from the literature on the development of children's word definitions (Annett, 1959; Burns, 1960; Cronbach, 1943; Dale, et. al. 1960; Fiefel and Lorge, 1950; Flavell and Flavell, 1959; Lewinski, 1948; Petty et. al. 1968; Russell, 1954; Vinacke, 1951; and Welch, 1940).

TABLE 1 About Here

Basically the study was seen as a study in concept development wherein an attempt was made to discover whether or not children possessed the various logico-semantic concepts by having them sort exemplars into categories and then explain the sorting strategies employed. The work of Vygotsky (1962) and Bruner (1964) provided the framework for analyzing the sorting strategies.

Vygotsky (1962) takes the position that three basic phases are passed through in the ascent to concept formation.

TABLE 1

TWENTY-FOUR CATEGORIES OF LOGICO-SEMANTIC RELATIONS EXHIBITED IN DEFINITIONS USED BY CHILDREN

Set

A 1. Synonym. The members of each word pair have exactly or very nearly the same referent:

e.g. steal - rob

big - large

A 2. Similarity. The members of each word pair are similar through being aligned on some dimension, with the referent of the right-hand member occupying a more extreme position of this dimension:

e.g. hungry - starving

small - tiny

A 3. Superordinate. The left-hand member denotes a common class of which the right-hand concept is a member:

e.g. fruit - apple

bird - sparrow

A 4. Whole-part. The right-hand member of each pair refers to a familiar object recognized as an important part of a familiar whole denoted by the left-hand member:

e.g. bird - wing

hand - finger

A 5. Generic Definitions. The right-hand member denotes the common class to which the left-hand member belongs:

e.g. kindle - burn

cup - dinnerware

Set

B 6. Coordinate. The members of each pair refer to familiar members of a familiar class:

e.g. chair - table

beets - peas

B 7. Contrast. The members of each word pair refer to opposite ends of a continuum:

e.g. hard - easy

loud - soft

B 8. Part-part. The members of each pair refer to familiar objects which are parts of a familiar whole:

e.g. wall - floor

arm - head

B 9. Free Association. The members of the unit are free associates:

e.g. carry - heavy

enjoy - fun

B 10. Connotation. The right-hand member of each pair connotes a relationship with the left-hand member:

e.g. modern - good

royal - strong

C 11. Attribute. The right-hand member of each pair refers to a quality or attribute generally recognized as characterizing the object denoted by the left-hand member:

e.g. turtle - slow

lemon - sour

Set

C 12. Action-of. The right-hand member of each pair is an intransitive verb denoting concrete action associated with and performed by the agent referred to by the left-hand member:

e.g. baby - cry

dog - bark

C 13. Action-upon. The left-hand member of each pair is a transitive verb denoting a concrete action associated with and performed upon the object referred to by the right-hand member.

e.g. sweep - floor

throw - ball

C 14. Common Use. The right-hand member of each pair denotes an object associated with and acted upon by the agend referred to by the left-hand member:

e.g. farmer - tractor

dog - bone

D 15. Use Of. The right-hand member of each unit denotes a use made of the left-hand member:

e.g. envelope - for putting letters in

orange - for eating

D 16. Contiguity. The left-hand member of the unit is defined by direct concrete interaction of place, time or activity with the right-hand member:

e.g. apple - grows on a tree

late - you can see by the clock

Set

D 17. Analysis. The right-hand member is an analysis of the left-hand member indicating certain dimensions of function of this concept:

e.g. lengthen - make a thing longer

rule - to control people

D 18. Synthesis. The right-hand member defines the left-hand member by stating its relation with other concepts commonly associated with it:

e.g. acorns - from an oak tree

bunk - it has two levels

D 19. Ostensive Definition. The right-hand member defines the left-hand member largely on the basis of experience:

e.g. selfish - all for yourself

tickle - you make someone laugh

E 20. Repetition. The right-hand member of each unit is a repetition of the concept referred to by the left-hand member:

e.g. drink - a drink of water

tap - a tap on the wall

E 21. Extension of a class (Implication). The right-hand member of the unit gives examples of concepts to which the left-hand member might refer implying a degree of familiarity with the concept:

e.g. farming - crops and animals

bugs - insects and flies

Set

E 22. Denotation in Context. The left-hand member is defined by use in context:

e.g. sharpen - sharpen the knife till it cuts well

bitten - bitten by a snake

E 23. Class Membership Implied. The right-hand phrase attempts to bridge the gap between general and specific by using phrases such as "a kind of", "sort of" or "like a":

e.g. stool - like a chair

cone - like an ice-cream cone

E 24. Intension of a Class (Genus et Differentia). The right-hand member states the class as well as the distinguishing features of the left-hand member:

e.g. sipped - drank a little at a time

notice - see and remember

1. Objects are placed together in heaps for purely subjective reasons with the heaps often being held together by a theme.

2. Objects are placed together according to objective bonds that exist between them, but these bonds lack a logical unity so that there may be many different rules for including the different objects in a single group. The groups at this stage are called complexes.

3. Objects are placed into groups according to a single rule.

Bruner and Oliver (1963) and Bruner (1964) noted a similar developmental trend in that younger children rely most heavily on perceptual attributes of objects to form complexes, but as they grow older they begin to focus on functional properties to form superordinate groupings, or true concepts. Both the Bruner and Vygotsky views are consistent with the research on the development of word definition abilities cited earlier. In the present study, an attempt was made to classify the sorting strategies of the subjects according to the three levels, thematic groupings, complexes and superordinate concepts.

METHOD

The Task

A pilot study was carried out using three decks of 48 cards. Each deck contained two examples from each of Evanechko's 24 categories. The subjects were asked to verbalize their grouping strategies. From the results, it was found that the task was too unwieldy, particularly for younger subjects. The subjects required a huge physical area to do the task, they could not keep track of their reasons for sorting, and with only two examples for each category they found it difficult to obtain satisfactory closure on their categories.

It was decided to alleviate the problem by increasing the number of examples available from each theoretical category, and decreasing the number of categories represented within the set that a particular individual had to sort. Ultimately it was decided to break the 24 categories into five sets (one set of four categories and the rest each having five categories). The disadvantage of this technique is that it is impossible to see if the children can discriminate among all of the categories at the same time. Because of this, it was decided to try to place the categories into sets in such a way that categories which might easily be confused with each other should appear in the same set, and that categories with obvious differences should be separated. In other words, steps had to be taken to maximize the opportunities of rejecting the hypothesized structure.

Since Evanechko (1970) had suggested five logical sets of the categories, this provided a useful starting point. Pilot studies revealed that in simplifying the sorting task most individuals divided the examples into two piles, one containing categories with single word definers, and the other containing categories of multiple word definers. Since the subjects did this anyway, care was taken to place single word and multiple word definers in different sets. Also, in the Evanechko and Maguire study as well as in the pilot work it was found that subjects confused Superordinate and Generic meanings, Coordinate, Part-Part and Free Association meanings, Attribute and Action-of meanings, and Repetition and Denotation in Context meanings. In grouping the categories, often confused categories were placed in the same set. The resulting sets are shown in Table 1.

For each category in each set, six examples were selected from

Evanechko's pool, so that each set of categories consisted of 30 examples (except for C which had 24). The definitions were printed on two inch by four inch cards and randomly arranged in decks corresponding to the five sets.

Subjects

The task was administered to 176 subjects in grade 5, 196 subjects in grade 8, and 198 subjects in grade 11. An approximately equal number of subjects sorted each task at each grade level. Each subject was given a copy of the introduction, an answer sheet, and one of the five sets of cards. Care was taken to insure that neighbouring students received different decks of cards. In each set, the cards were arranged in random order.

Procedure

An introduction was given consisting of two parts. In the first part, classification principles were illustrated using geometric figures of different sizes. The students were shown that there are many ways of grouping the figures and that any way is correct provided that there is some reason for putting an object in a group. In the second part of the introduction, a set of nine definitions not used in the study was grouped for the students in two different ways. Care was taken to indicate that the illustrated groupings were not the only ways that the definitions could be grouped. Although there was some concern that the example sorts might influence the grouping strategies of the subjects, it was decided that if Vygotsky and Bruner positions had much validity, the strategies employed by the subjects would not be greatly influenced by the two examples. In short, the subjects would hear what they were capable of hearing.

The advantage of the two examples was to show the students the form of the response required, and to illustrate that there was more than one way to do the task. The students were told that they could use as many categories as they wanted to, and that they could put as many cards in each category as they wanted to, but that all cards in a set should have similar definitions.

Method of Analysis

The data were analyzed for each grade by set combination by the latent partition analysis (LPA) procedure outlined by Wiley (1967). In general, LPA is used in situations in which subjects partition a set of items into a number of categories, where there are no restrictions on the number of partitions, nor on the number of items placed in each of the categories. The LPA model assumes that when a relatively homogeneous group of people sorts a set of objects, there exists a latent partitioning of the objects which underlies each individual's manifest partition. In the errorless case different manifest partitions arise from the combination of various latent categories, or from the fractionation of latent categories. The basic model is

$$S = \phi' \Omega \phi + \Delta^2$$

Where $\underline{S}$ is a matrix of item joint occurences (the proportion of times pairs of items are sorted together), ϕ is the latent partition matrix which in the errorless case consists of 1's and 0's according to whether an item is in a particular latent category or not, Ω is the confusion matrix indicating the probability of an item being included in two different categories under independent sortings, and Δ^2 is the probability of items being included in two different categories under independent

sortings.

The procedures for determining the number of latent categories and the matrices ϕ, Ω, and Δ^2, are described in Wiley (1967), and need not be reiterated. In the present study, for each set of definitions, there are four partitions available, ϕ_{11}, ϕ_8, ϕ_5, ϕ_T. The subscripts 11, 8, and 5 refer to grade level; the subscript T refers to the theoretical partition based on Evanechko's categories of definitions. The ϕ matrices for grade 5, 8, and 11 were crosstabulated with each other and with ϕ_T for each set.

The extent to which the four partitions of each of the five sets agreed with each other was measured using Evan's (1970) index of agreement A. This index ranges from 0, representing no agreement to 1 representing complete agreement. If X_{ab} is a matrix whose elements x_{jk} are the numbers of times examples of definitions in the j^{th} category of partition 'a' also occur in the k^{th} category of partition 'b', then a perfect crosstabulation exists between a and b if X_{ab} is a square matrix with only one entry in any row or column being greater than zero. For these partitions A = 1. For less perfect agreement the calculation of A depends on the amount of disagreement relative to the maximum amount of disagreement. The calculation of the maximum amount of disagreement described by Evans was modified by Patsula (1972) to avoid situations in which the maximum possible disagreement as defined by Evans is based on impossible situations.

RESULTS

The indices of agreement between the latent partitions for each of the five sets are shown in Table 2. In Table 3, the crosstabulation matrices between each grade and the theoretical partition are presented along with the index of agreement and the number of subjects upon whom the empirical partitions are based. From these tables it can be seen that in all sets except C the degree of agreement between the latent partitions and the theoretical partition increased from grade 5 to grade 8 to grade 11. In Set C, the agreement between T and 11 is less than for either 8 or 5. If one postulates a developmental trend toward T, then the data are supportive of the hypothesis in all cases except C. Since the sampling distribution of the index of agreement is not known, it is impossible to investigate the differences on the basis of inferential statistics. Considering Table 3, it must be admitted that the differences in contingency tables whose indices of agreement are of the order of .72 to .76 (Set B grades 5 and 8) would be difficult to detect by eye. Differences of the order .79 to .91 (Set C grades 11 and 8) are more obvious.

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TABLES 2 and 3 about here
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Although the differences in successive indices are not always large, the consistency of the trend (excepting Set C) which exists in independent samples with independent stimuli gives strong support to the developmental hypothesis. Additional evidence (although not independent) can be garnered from the indices of agreement between grades within sets. If a trend exists, the agreement between grades 5 and 11 should be less

TABLE 2

INDEX OF AGREEMENTS BETWEEN DIFFERENT PARTITIONS OF THE FIVE SETS OF DEFINITIONS

Between	Sets				
	A	B	C	D	E
T & 11	0.94	0.84	0.79	0.94	0.80
T & 8	0.74	0.76	0.91	0.75	0.61
T & 5	0.62	0.72	0.88	0.55	0.46
11 & 8	0.79	0.71	0.90	0.79	0.69
8 & 5	0.72	0.74	0.84	0.76	0.62
11 & 5	0.59	0.72	0.74	0.57	0.56

TABLE 3

CROSSTABULATIONS BETWEEN THE LATENT PARTITIONS AT EACH GRADE LEVEL AND THE THEORETICAL PATTERN

Grade	Theoretical				
	Set A	Set B	Set C	Set D	Set E
11	6 0 0 0 0 0 6 0 0 0 0 0 6 0 0 0 0 0 6 0 0 0 0 0 3 0 0 0 0 3	6 0 0 0 0 0 6 0 0 0 0 0 6 4 0 0 0 0 2 0 0 0 0 0 4 0 0 0 0 2	6 0 0 0 0 6 0 0 0 0 4 0 0 0 0 3 0 0 2 3	6 0 0 0 0 0 6 0 0 0 0 0 6 0 0 0 0 0 6 0 0 0 0 0 3 0 0 0 0 3	6 1 0 0 0 0 5 0 0 0 0 0 4 0 1 0 0 2 1 1 0 0 0 5 0 0 0 0 0 4
	A = .94 n = 40	A = .84 n = 39	A = .79 n = 40	A = .94 n = 39	A = .80 n = 40
8	6 0 0 0 0 0 5 1 2 0 0 0 5 0 0 0 1 0 3 0 0 0 0 0 3 0 0 0 1 3	6 0 0 0 0 0 5 0 0 4 0 0 4 0 0 0 0 2 1 0 0 0 0 5 0 0 1 0 0 2	6 0 0 0 0 6 0 0 0 0 6 0 0 0 0 3 0 0 0 3	6 0 0 0 0 0 5 0 0 1 0 0 2 0 0 0 0 4 2 0 0 0 0 4 0 0 1 0 4 0 0 0 0 0 2	5 5 0 0 0 0 0 5 0 2 0 0 0 4 0 0 0 0 0 3 0 0 1 1 0 1 1 0 1 1
	A = .74 n = 40	A = .76 n = 38	A = .91 n = 41	A = .75 n = 39	A = .61 n = 38
5	6 0 0 0 0 0 4 0 1 0 0 0 3 0 1 0 0 1 0 0 0 0 1 2 0 0 1 0 2 0 0 0 1 0 4 0 1 0 1 1	3 0 0 0 0 3 0 0 0 0 0 5 0 0 0 0 0 6 1 0 0 0 0 4 0 0 0 0 0 2 0 0 0 0 2 0 1 0 1 2	6 0 0 0 0 4 0 0 0 2 0 1 0 0 6 0 0 0 0 5	5 0 0 0 0 0 5 0 0 3 0 0 1 0 0 0 0 2 1 0 0 0 2 2 0 0 0 1 3 0 0 1 0 0 2 1 0 0 0 1	2 1 0 1 0 2 4 0 0 0 0 0 3 0 0 0 0 1 1 0 0 0 0 1 0 0 0 0 1 0 1 0 1 2 0 0 0 0 0 4 1 1 1 0 2
	A = .62 n = 35	A = .72 n = 34	A = .88 n = 35	A = .55 n = 36	A = .46 n = 36

than either the agreement between grades 5 and 8, or 8 and 11. In all sets except B this is the case. In Set B, $A_{8,11} = .71$ and $A_{5,11} = .72$.

An interesting result that occurred was that apart from Set B, $A_{5,8}$ is less than $A_{8,11}$. This would be consistent with the idea that greater change takes place between grades 5 and 8 than from grades 8 and 11.

Both of the anamalous sets (B and C) produced fairly high values for the index of agreement (all above .7) at all grade levels. This suggests that the subjects may have found the stimuli so easy to categorize that there was no discrimination along the developmental continuum. A close examination of the groupings made in Set C by the grade 11 students indicated that their lower agreement with T was caused by a tendency to overclassify. In the Action-of category, they discriminated between auditory actions and physical actions (example: baby-cry vs. rabbit-hop). It also appears that grade 11 sorters discriminated between Attribute of things and Attribute of animals (example: flame-hot vs. turtle-slow).

The overall consistency among subjects in grouping elements can be described by the average of $(1-\delta_j^2)$ where δ_j^2 is the diversity of item j, the probability of item j being included in two different manifest categories under independent sortings. Table 4 shows the average value of δ_j^2 for the fifteen situations (five sets by three grades). Also shown in the table are the number of categories in the derived latent partition, and the average number of categories used by the sorters as they did the task.

TABLE 4 about here

TABLE 4

AVERAGE OF $(1 - \delta_j^2)$ FOR THE FIFTEEN LATENT PARTITIONS

Set	Grade	Average of $1 - \delta_j^2$	Number of Theoretical Categories	Number of Categories in Latent Partition	Average Number of Categories in Manifest Partition	Standard of Deviation
	5	.605	5	8	7.5	2.68
A	8	.681	5	6	5.7	2.41
	11	.727	5	6	5.6	2.21
	5	.552	5	8	7.1	3.11
B	8	.635	5	6	5.8	2.57
	11	.731	5	6	5.4	2.05
	5	.647	4	5	6.0	2.32
C	8	.822	4	5	4.6	1.14
	11	.819	4	5	5.0	1.34
	5	.500	5	8	8.4	4.47
D	8	.652	5	7	6.6	2.55
	11	.665	5	6	6.2	2.10
	5	.553	5	9	8.1	4.47
E	8	.564	5	6	6.1	3.10
	11	.623	5	6	6.2	3.22

In all cases except Set C the consistency increases from grades 5 to 8 to 11. In Set C the average value for $(1-\delta_j^2)$ is .822 for grade 8, and .819 for grade 11. This difference is very small, and both values indicate that the consistency is so high that both groups can only be described as very consistent. In all cases the average number of manifest categories is greater in grade 5 than in either grades 8 or 11. Consistent with this (and partly as a result of it), the standard deviations are also smaller for the grade 5 groups. When comparing the grade 8 and 11 groups, the data on the number of manifest categories does not exhibit the same strong trend. The differences between the two grades are generally small, indicating that the major differences occurred between grades 5 and 8.

Strategies

In order to investigate grouping strategies the students were asked to pick one set and explain how the definitions were similar. As stated earlier, thematic grouping, complexes, and superordinate grouping were seen by Vygotsky and Bruner as typical stages in the development of concept formation ability. In Table 5 the responses are grouped according to these stages, and to maneuvers within stages. The data are summed over the five sets.

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TABLE 5 about here

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An initial phase on the way to concept formation comprises many variations of a type of thinking that can be called thematic grouping. Definitions or key words are put together by virtue of participating in a sentence or a little story. In thematic grouping, n different rules are used to account for the n different stimuli placed

TABLE 5

CLASSIFICATION OF GROUPING STRATEGIES

Grade	Left Blank or Meaningless	Thematic Groupings	Complexes			Superordinate Concepts		To
			Associative Types	Key Rings	Multiple Groupings	Subject Oriented	Definition Oriented	
5	17	5	50	2	4	37	61	1
8	7	0	29	1	0	29	130	1
11	9	1	9	0	0	38	141	1

together in the group. An example of grouping by theme taken from the grade 5 responses to Set E is:

> "One man is stealing and he is killing and the police said surrender because he was killing people with sharp knifes and it was bloody." Grouped in this set were:
>
> crime - stealing or killing
>
> surrender - surrender or be caught and killed
>
> sharpen - sharpen the knife till it cuts well
>
> bloody - a bloody knife

A second phase on the way to concept formation involves variations of thinking in complexes. In a complex the bonds between the definitions placed in a particular group are concrete rather than abstract. Any concrete quality present in the definitions or their surroundings is used as a basis for grouping. Three strategies that illustrate thinking in complexes are associative groupings, key rings, and multiple groups. In an associative strategy, the child notes a factual relationship between two definitions and all other definitions are related to this relationship. An example of a response from grade 11, Set D was:

> "Hunting or camping out, shotgun - used as weapon, fishhook - when camping you fish, camera - taking pictures of your outing, knife - weapon - useful instrument, tickle - deals with laughter & enjoyment one receives when camping." Grouped in this set were:
>
> camera - for taking pictures
>
> shotgun - for shooting
>
> tickle - you make someone laugh

knife - it has a blade

fishhook - it is attached to a line and rod

In a key ring strategy one definition is taken as the key and all other definitions in the group are included because they possess an attribute in common with the key definition. An example of a key ring response from grade 5 Set D was:

> "I picked set 7 the first card I got was interfere I also picked pebble because I thought a pebble would interfere, I picked iceberg because icebergs interfere with ships because ships sometimes crash into icebergs." Grouped in this set were:
>
> interfere - when you get in the way (KEY)
>
> pebble - found lying on the ground
>
> iceberg - from a glacier

At a less advanced stage in the use of complexes is the use of multiple groupings. Here, instead of one general rule for inclusion there may be several rules used to justify the inclusion of different definitions. An example of grouping by multiple groupings that appeared for Set D, grade 5 was:

> "Scissors are very sharp, a knife can cut you, a stove is very hot. Envelopes are to put letters in, fishhooks are to put on lines. Apples grow, chickens lay eggs." Grouped in this set were:
>
> egg - from a chicken
>
> stove - found in a kitchen
>
> knife - it has a blade
>
> scissors - for cutting

envelope - for putting letters in

fishhook - it is attached to a line and rod

apple - grows on a tree

Considerable more sophisticated than thematic groupings and complexes are superordinate concepts in which one universal rule for inclusion accounts for all of the definitions in the set. Both Vygotsky (1962) and Bruner and Oliver (1963), indicate that true concepts or superordinate concepts could be formed at various levels of sophistication. In the present study, two levels were noted. At the lower level, the subjects focussed on the perceptual or subject features of the cards. At the higher level attention was directed to the functional or definition properties.

In subject oriented concepts, the word being defined or a key word from the body of the definition is taken and similarity is judged by focusing only on the quality or attributes of this single word. The sorter concentrates on the type of word being defined and placed the cards into sets of similar subject matter. An example of grouping while being subject orientated, taken from grade 11, Set D was:

"In set 4 the rule used was that the things listed had to do with land and or water." Grouped in this set were:

pebble - found lying on the ground

iceberg - from a glacier

dock - where ship ties up

fishhook - it is attached to a line and rod

In definition oriented concepts the sorter concentrates on the whole definition and places the cards into sets so that all cards in a set have definitions that are similar. The universal rule of inclusion accounts for all definitions in the set by relating how the defining words give meaning to the respective subjects of the definitions in similar manner. An example of grouping while being definition oriented, taken from grade 5, Set A was:

> "In one of my sets (set 2) which consisted of 11 cards I used this rule: I looked at both words and if one of the words was a type of the other (eg. bird - budgie) I would pick it for this set." Grouped in this set were:

dog - collie	dessert - pie
basketball - game	fish - salmon
apple - fruit	bird - robin
beetle - insect	vegetable - carrot
daffodil - flower	animal - deer
mushroon - plant	

Only five subjects, all from grade 5 did not respond to the task of selecting and describing a group of definitions. In addition, 28 subjects' answers were judged to be "heaps" or impossible to categorize. (e.g. "I put these together because they all go together.") The results shown in Table 5 indicate that the proportion of subjects using definition oriented concepts was greatest at grade 11 and lowest at grade 5. The proportion of subjects using themes or complexes in their grouping strategies was greatest at grade 5 and lowest at grade 11.

DISCUSSION

The results of the present study provide additional supportive evidence for the validity of the distinctions among Evanechko's 24 logico-semantic relationships. Although it was not possible to have subjects sort examples of all 24 relationships at one time, an attempt was made to have groups of subjects work with relationships that were likely to be confused with each other. Within this constraint, the older subjects produced latent categories that were remarkably similar to Evanechko's, with most discrepencies being caused by "over-discrimination", i.e. making two categories where Evanechko had only one.

The most important finding was the strong developmental trend that was found both in the increased congruence of the latent categories to the theoretical categorization, and in the increased sophistication of the grouping strategies employed by the subjects over age levels. This finding is consistent with the Vygotsky and Bruner positions on concept formation generally, in that the development of concepts about word meaning appears to move from a fairly personalized level through a stimulus controlled level to a more formal structural level.

There was some evidence to suggest that greater changes occurred between grades 5 and 8, than between grades 8 and 11. This is consistent with Piaget's (1950) view of cognitive development. Between grades 5 and 8 most of the children would be moving into the formal operations period which would allow them to attend to the structural and logical aspects of the definitions.

The evidence concerning the age at which the subject was able

to classify the definitions may have been clouded by the high imagery values of many of the words used. Paivio (1969) states that there are two processes that underlie meaning, one deriving meaning from the interassociative relations among the words; the other deriving meaning from the imaginal representation of the words or units. Presumably if the image evoking qualities of the definitions used were high, it would be much harder for the subjects to attend to the structural qualities of the definition.

An interesting area for future research would be the exploration of the development of flexibility in children's word definition abilities. It seems clear from the present study, that there is increased ability to make formal discriminations among kinds of word meanings. The appropriateness of the use of particular classes of meaning depends on the social and psychological context. Presumably the ability to apply different kinds of meaning to words in different contexts is developmental as well. If this is so, there will be interesting implications for the development of language arts curricula for children.

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